Amendments to the Claims

1. (currently amended) A method for imaging an associated object, comprising the steps of:

directing one part of a low coherence optical radiation towards an associated object through an optical system, which ensures focusing the low coherence optical radiation onto the object;

scanning the low coherence optical radiation being directed towards an associated object over a transverse scanning surface that is approximately orthogonal to the direction of propagation of said optical radiation;

providing a first lens component with positive focal power after the transverse scanning surface and providing a second lens component with positive focal power after the first lens component, where the first lens component and the second lens component are positioned to provide a constant propagation time for the low coherence optical radiation propagating from a given point of the transverse scanning surface to a corresponding conjugate point of an image plane, thereby eliminating a transverse scanning related aberration of an optical path length for the low coherence optical radiation directed towards an associated object;

directing another part of the low coherence optical radiation along a reference optical path, and

combining an optical radiation having returned from an associated object with an optical radiation that passed through the reference optical path;

visualizing an intensity of the optical radiation having returned from an associated object using for that an optical radiation that is a result of the combining.

2. (previously presented) A method as claimed in claim 1, further comprising the step of longitudinal scanning by varying a difference between the optical path lengths for the low coherence optical radiation directed towards the object and low coherence optical radiation directed along the reference path, said longitudinal scanning

being performed for given coordinates in the transverse scanning surface in compliance with a predetermined rule.

3. (original) A method as claimed in claim 2, wherein the difference between the optical path lengths for the low coherence optical radiation directed towards the object and low coherence optical radiation directed along the reference path is varied by at least several tens of wavelengths of the low coherence optical radiation.

4. (original) A method as claimed in claim 2, wherein the difference between the optical path lengths is varied by altering the optical path length for the low coherence optical radiation propagating from the transverse scanning surface to the optical system.

5. (previously presented) A method as claimed in claim 1, wherein the object is a biological tissue of a living body.

6. (original) A method as claimed in claim 5, wherein the object is an internal cavity of a living body.

7. (original) A method as claimed in claim 1, wherein the low coherence optical radiation is an optical radiation in the visible or near infrared range.

8. – 35. (cancelled)

36. (previously presented) An apparatus for imaging an associated object comprising:

a source of low coherence optical radiation;

an interferometer optically coupled to the source, the interferometer including a beam splitter optically coupled with a measuring arm and a reference arm;

at least one photodetector connected with a data processing and displaying unit; the measuring arm being provided with a delivering device for low coherence optical radiation;

the delivering device comprising an optical fiber optically coupled with an optical system, and a transverse scanning system for the low coherence optical radiation, the optical fiber being positioned to allow for the low coherence optical radiation to pass from the proximal end of the delivering device to its distal end, wherein the optical fiber is incorporated into the transverse scanning system, which is configured to move the end face of the distal part of the optical fiber over the transverse scanning surface in a direction approximately perpendicular to an axis of the optical fiber;

wherein the optical system of the delivering device is configured to provide focusing of the low coherence optical radiation onto the associated object, said optical system including at least a first lens component with positive focal power and at least a second lens component with positive focal power, which is positioned after the first lens component, wherein the first lens component and the second lens component are positioned to provide constant propagation time for low coherence optical radiation propagating from a given point of the transverse scanning surface to a corresponding conjugate point of an image plane, thereby eliminating the transverse scanning related aberration of the optical length of the measuring arm.

37. (previously presented) An apparatus as claimed in claim 36, wherein the transverse scanning surface has a non-zero curvature.

38. (previously presented) An apparatus as claimed in claim 37, wherein the optical fiber serves as a flexible cantilever and is fixedly attached to a bearing support incorporated into the delivering device for low coherence optical radiation.

39. (previously presented) An apparatus as claimed in claim 36, wherein the first and second lens components of the optical system are positioned substantially confocally.

40. (previously presented) An apparatus as claimed in claim 37, wherein the first lens component of the optical system is placed at a distance substantially equal to the focal length of the first lens component from the transverse scanning surface, while the distance between the first and second lens components of the optical system is diverse from that corresponding to a substantially confocal position of the lens components by a value $\delta 1$, which is related with the focal length F1 of the first lens component and the radius of curvature R of the transverse scanning surface by the following relation:

$$\delta 1 \cong (F1)^2 / R.$$

41. (previously presented) An apparatus as claimed in claim 37, wherein the first lens component of the optical system is offset by a distance $\delta 2$ from the position at which the distance from the first lens component to the transverse scanning surface is substantially equal to the focal length F1 of this lens component, while the distance between the first and second lens components of the optical system is diverse from the distance corresponding to the substantially confocal position of the lens components by a value $\delta 3$, which is given by the relation:

$$\delta 3 \cong (F1)^2 /(R + \delta 2).$$

42. (previously presented) An apparatus as claimed in claim 36, wherein the delivering device for low coherence optical radiation is an optical fiber probe.

43. (previously presented) An apparatus as claimed in claim 36, wherein at least one interferometer arm is additionally provided with a device for longitudinal scanning.

44. (previously presented) An apparatus as claimed in claim 43, wherein the device for longitudinal scanning is placed in the measuring arm of the interferometer

and is configured to provide altering the optical length of the part of the measuring arm located between the transverse scanning surface and the optical system.

45. (previously presented) An apparatus as claimed in claim 44, wherein the optical system includes a magnification factor M that is related to the refractive index $N1$ of a subsurface part of the object to be imaged, where $M = 1/N1$.

46. (previously presented) An apparatus as claimed in claim 44, wherein the optical system includes a magnification factor M that is related to the refractive index $N2$ of the medium adjoining the surface of the object to be imaged, where $M = 1/N2$.

47. (previously presented) An apparatus as claimed in claim 44, wherein the device for longitudinal scanning is placed within the delivering device for low coherence optical radiation.

48. (previously presented) An apparatus as claimed in claim 44, wherein the end face of the optical fiber is provided with a microlens, which is rigidly attached to the optical fiber.

49. (previously presented) A delivering device for low coherence optical radiation, comprising:

an optical fiber optically coupled with an optical system, and a transverse scanning system for the low coherence optical radiation;

the optical fiber being incorporated into the transverse scanning system and positioned to allow for low coherence optical radiation to pass from the proximal end of the delivering device to its distal end;

the transverse scanning system being configured to move an end face of the distal end of the optical fiber over a transverse scanning surface in a direction approximately perpendicular to an axis of the optical fiber,

wherein the optical system includes at least a first lens component with positive focal power and at least a second lens component with positive focal power, which is positioned after the first lens component, said optical system providing focusing the low coherence optical radiation onto an object, wherein the first lens component and the second lens component are positioned to provide constant propagation time for low coherence optical radiation propagating from a given point of the transverse scanning surface to a corresponding conjugate point of an image plane, thereby eliminating the transverse scanning related aberration of the optical length for the low coherence optical radiation passing through the delivering device.

50 (previously presented) A delivering device as claimed in claim 49, wherein the transverse scanning surface has a non-zero curvature.

51. (previously presented) A delivering device as claimed in claim 50, wherein the optical fiber serves as a flexible cantilever and is fixedly attached to a bearing support incorporated into the delivering device for low coherence optical radiation.

52. (previously presented) A delivering device as claimed in claim 49, wherein the first and second lens components of the optical system are positioned substantially confocally.

53. (previously presented) A delivering device as claimed in claim 50, wherein the first lens component of the optical system is placed at a distance substantially equal to the focal length of the first lens component from the transverse scanning surface, while the distance between the first and second lens components of the optical system is diverse from the distance corresponding to the substantially confocal position of the lens components by a value $\delta 1$, which is related to the focal length F1 of the first lens component and the radius of curvature R of the transverse scanning surface by the following relation:

$$\delta 1 \cong (F1)^2 / R .$$

54. (previously presented) A delivering device as claimed in claim50, wherein the first lens component of the optical system is offset by a distance $\delta 2$ from the position at which the distance from the first lens component to the transverse scanning surface is substantially equal to the focal length F1 of this lens component, while the distance between the first and second lens components of the optical system is diverse from the distance corresponding to the substantially confocal position of the lens components by a value $\delta 3$, which is given by the relation:

$$\delta 3 \cong (F1)^2 / (R + \delta 2).$$

55. (previously presented) A delivering device as claimed in claim 49, wherein the delivering device for low coherence optical radiation is designed as an optical fiber probe, whereas the optical fiber, the optical system and the system for transverse scanning of low coherence radiation are encased into an elongated body with a throughhole extending therethrough, the optical fiber extending through the throughhole.

56. (previously presented) A delivering device as claimed in claim 49, wherein an output window of the delivering device for low coherence optical radiation is arranged near the image plane of the end face of the distal part of the optical fiber.

57. (previously presented) A delivering device as claimed in claim 56, wherein the second lens component of the optical system serves as the output window of the delivering device for low coherence optical radiation.

58. (previously presented) A delivering device as claimed in claim 56, wherein a normal line to an outer surface of an output window of the delivering device is oriented at an angle to the direction of incidence of the low coherence optical radiation on the outer surface, the angle exceeding a divergence angle of the low coherence optical radiation at a place of its intersection with the outer surface.

59. (previously presented) A delivering device as claimed in claim 58, wherein when using a one-coordinate substantially linear trajectory of transverse scanning the second lens component is offset both in a direction that is orthogonal to the direction of transverse scanning, and in a direction that is orthogonal to the direction of propagation of the low coherence optical radiation.

60. (previously presented) A delivering device as claimed in claim 49, wherein the delivering device is provided additionally with a device for longitudinal scanning designed as a device for altering the optical path length for the low coherence optical radiation propagating from the transverse scanning surface to the optical system.

61. (previously presented) A delivering device as claimed in claim 60, wherein the optical system includes a magnification factor M that is related to the refractive index $N1$ of a subsurface part of the object to be imaged, where $M = 1/N1$.

62. (previously presented) A delivering device as claimed in claim 60, wherein the optical system includes a magnification factor M that is related to the refractive index $N2$ of the medium adjoining the surface of the object to be imaged, where $M = 1/N2$.

63. (previously presented) A delivering device as claimed in claim 49, wherein the end face of the optical fiber is provided with a microlens, which is rigidly attached to the optical fiber.